What is claimed is:

1. A data detecting apparatus for equalizing an input signal by partial response by employing at least one of partial response class 4 (PR4) and extended partial response class 4 (EPR4), and decoding the input signal, comprising:

(a) first equalizing means for equalizing the input signal by PR4, and generating a first equalized signal;

(b) first decoding means for decoding the first equalized signal and obtaining first decoded data;

(c) second equalizing means for equalizing the input signal by EPR4, and generating a second equalized signal;

(d) second decoding means for decoding the second equalized signal and obtaining second decoded data ;

(e) condition discriminating means for discriminating the signal condition of the input signal from the first equalized signal and second equalized signal, judging the optimum data detecting method, and generating a condition discriminating signal; and

(f) selecting means for selecting one of the first decoded data and the second decoded data based on the condition discriminating signal, so as to obtain detected data.

2. The data detecting apparatus of claim 1,

wherein said second equalizing means includes first filter means for converting and filtering the entered first equalized signal, and converting into an EPR4 equalized signal.

3. The data detecting apparatus of claim 1 or 2,

wherein said signal condition discriminating means comprises:

(e1) first error detecting means for extracting an error from the first equalized signal, and extracting a first error signal;

(e2) first smoothing means for averaging one of the square value and the absolute value of the first error signal, and obtaining a first smoothed error signal;

(e3) second error detecting means for extracting an error from the second equalized signal, and extracting a second error signal;

(e4) second smoothing means for averaging one of the square value and the absolute value of the second error signal, and obtaining a second smoothed error signal; and

(e5) judging means for judging the condition of the input signal from the condition of the first smoothed error signal and second smoothed error signal.

4. The data detecting apparatus of claim 3,

wherein said judging means includes comparing means for issuing the result of discrimination by

(e5-1) selecting first decoded data which is the output of the first decoding means in a case when the first smoothed error signal is smaller in amplitude than the second smoothed error signal multiplied by a specific value; or

(e5-2) selecting second decoded data which is the output of the second decoding means in the other cases.

5. A data detecting apparatus for equalizing an input signal by partial response by employing at least one of partial response class 4 (PR4) and extended partial response class 4 (EPR4), and decoding the input signal, comprising:

(a) first equalizing means for equalizing the input signal by PR4, and obtaining a first equalized signal;

(b) first decoding means for obtaining first decoded data from the first equalized signal;

(c) second equalizing means for equalizing the input signal by EPR4, and obtaining a second equalized signal;

(d) second decoding means for obtaining second decoded data from the second equalized signal;

(e) signal condition discriminating means for obtaining a condition discriminating signal for discriminating the optimum data detecting method based on the signal condition of the input signal only by the first equalized signal; and

(f) selecting means for selecting one of the first decoded data and the second decoded data based on the condition discriminating signal, so as to obtain detected data.

6. The data detecting apparatus of claim 5,

wherein said second equalizing means includes first filter means for filtering the first equalized signal, and converting into an EPR4 equalized signal.

7. The data detecting apparatus of claim 5 or 6,

wherein said signal condition discriminating means comprises:

(e1) error detecting means for detecting an error from the first

equalized signal, and extracting a first error signal;

(e2) first smoothing means for averaging one of the square value and the absolute value of the first error signal, and obtaining a first smoothed error signal;

(e3) second filter means for converting and filtering the first error signal, and obtaining a second error signal;

(e4) second smoothing means for averaging one of the square value and the absolute value of the second error signal, and obtaining a second smoothed error signal; and

(e5) judging means for discriminating the condition of the input signal by the first smoothed error signal and second smoothed error signal.

8. The data detecting apparatus of claim 7,

wherein said judging means includes comparing means for issuing the result of discrimination by

(e5-1) selecting first decoded data in a case when the first smoothed error signal is smaller in amplitude than the second smoothed error signal multiplied by a specific value; or

(e5-2) selecting second decoded data in the other cases.

9. The data detecting apparatus of any one of claims 1, 2, 5, and 6, further comprising:

means for operating so as to reduce the power consumption by

(g1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected

data; or

(g2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

10. The data detecting apparatus of claim 3, further comprising:

means for operating so as to reduce the power consumption by

(g1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(g2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

11. The data detecting apparatus of claim 4, further comprising:

means for operating so as to reduce the power consumption by

(g1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(g2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

12. The data detecting apparatus of claim 7, further comprising:

means for operating so as to reduce the power consumption by

(g1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(g2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

13. The data detecting apparatus of claim 8, further comprising:

means for operating so as to reduce the power consumption by

(g1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(g2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

14. The data detecting apparatus of claim 9, further comprising:

timing control signal generating means for generating a control signal based on the discrimination result of the condition discriminating signal,

wherein said timing control means selects and controls generation of first decoded data, stop of second decoded data, stop of first decoded data, and generation of second decoded data, each at different timing, thereby

(f1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected

data; or

(f2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

15. The data detecting apparatus of claim 10, further comprising:

timing control signal generating means for generating a control signal based on the discrimination result of the condition discriminating signal,

wherein said timing control means selects and controls generation of first decoded data, stop of second decoded data, stop of first decoded data, and generation of second decoded data, each at different timing, thereby

(f1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(f2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

16. The data detecting apparatus of claim 11, further comprising:

timing control signal generating means for generating a control signal based on the discrimination result of the condition discriminating signal,

wherein said timing control means selects and controls generation of first decoded data, stop of second decoded data, stop of first decoded data, and generation of second decoded data, each at different timing, thereby

(f1) stopping the operation of said second equalizing means and

second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(f2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

17. The data detecting apparatus of claim 12, further comprising:

timing control signal generating means for generating a control signal based on the discrimination result of the condition discriminating signal,

wherein said timing control means selects and controls generation of first decoded data, stop of second decoded data, stop of first decoded data, and generation of second decoded data, each at different timing, thereby

(f1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(f2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

18. The data detecting apparatus of claim 13, further comprising:

timing control signal generating means for generating a control signal based on the discrimination result of the condition discriminating signal,

wherein said timing control means selects and controls generation of first decoded data, stop of second decoded data, stop of first decoded data, and generation of second decoded data, each at different timing, thereby

(f1) stopping the operation of said second equalizing means and second decoding means when the condition discriminating signal judges that the first decoded data is optimum, and generating the first decoded data as detected data; or

(f2) stopping the operation of said first decoding means when the condition discriminating signal judges that the second decoded data is optimum, and generating the second decoded data as detected data.

19. A data detecting method for equalizing an input signal by partial response by employing at least one of partial response class 4 (PR4) and extended partial response class 4 (EPR4), and decoding the input signal, comprising the steps of:

(a) equalizing the input signal by PR4, and obtaining a first equalized signal;

(b) obtaining first decoded data from the first equalized signal;

(c) equalizing the input signal by EPR4, and obtaining a second equalized signal;

(d) obtaining second decoded data from the second equalized signal;

(e) discriminating the signal condition of the input signal by the first equalized signal and second equalized signal, judging the optimum data detecting method, and generating a condition discriminating signal; and

(f) selecting one of the first decoded data and second decoded data based on the condition discriminating signal issued at said step (e), so as to obtain detected data.

20. The data detecting method of claim 19,

wherein said step (c) includes a step of converting and filtering the entered first equalized signal, and converting into an EPR4 equalized signal.

21. The data detecting method of claim 19 or 20,

wherein said step (e) comprises the steps of:

(e1) extracting an error from the first equalized signal, and obtaining a first error signal;

(e2) averaging one of the square value and the absolute value of the first error signal, and obtaining a first smoothed error signal;

(e3) extracting an error from the second equalized signal, and obtaining a second error signal;

(e4) averaging one of the square value and the absolute value of the second error signal, and obtaining a second smoothed error signal; and

(e5) judging the condition of the input signal from the condition of the first smoothed error signal and second smoothed error signal.

22. The data detecting method of claim 21,

wherein said step (e5) includes a step of issuing the result of discrimination by

(e5-1) selecting first decoded data in a case when the first smoothed error signal is smaller in amplitude than the second smoothed error signal multiplied by a specific value; or

(e5-2) selecting second decoded data in the other cases.

23. A data detecting method for equalizing an input signal by partial response by employing at least one of partial response class 4 (PR4) and

extended partial response class 4 (EPR4), and decoding the input signal, comprising the steps of:

(a) equalizing the input signal by PR4, and obtaining a first equalized signal;

(b) obtaining first decoded data from the first equalized signal;

(c) equalizing the input signal by EPR4, and obtaining a second equalized signal;

(d) obtaining second decoded data from the second equalized signal;

(e') obtaining a condition discriminating signal for discriminating the optimum data detecting method based on the signal condition of the input signal only by the first equalized signal; and

(f) selecting one of the first decoded data and second decoded data based on of the condition discriminating signal, so as to obtain detected data.

24. The data detecting method of claim 23,

wherein said step (c) includes a step of filtering the first equalized signal, and converting into an extended partial response class 4 equalized signal.

25. The data detecting method of claim 23 or 24,

wherein said step (e') comprises the steps of:

(e'1) detecting an error from the first equalized signal, and extracting a first error signal;

(e'2) averaging one of the square value and the absolute value of the first error signal, and obtaining a first smoothed error signal;

(e'3) converting and filtering the first error signal, and obtaining

a second error signal;

(e'4) averaging one of the square value and the absolute value of the second error signal, and obtaining a second smoothed error signal; and

(e'5) judging the condition of the input signal by the first smoothed error signal and second smoothed error signal.

26. The data detecting method of claim 25,

wherein said step (e'5) of judging the condition of the input signal by the condition of the first smoothed error signal and second smoothed error signal includes a step of issuing the result of discrimination by

(e'5-1) selecting first decoded data in a case when the first smoothed error signal is smaller in amplitude than the amplitude of the second smoothed error signal multiplied a specific value; or

(e'5-2) selecting second decoded data in the other cases.

27. A data detecting method for equalizing an input signal by partial response by employing at least one of partial response class 4 (PR4) and extended partial response class 4 (EPR4), and decoding the input signal, comprising the steps of:

(a) equalizing the input signal by PR4, and obtaining a first equalized signal;

(b) equalizing the input signal by EPR4, and obtaining a second equalized signal;

(c) judging the signal condition of the input signal by the first equalized signal and second equalized signal, discriminating the optimum data detecting method, and generating a condition discriminating signal;

(d) obtaining the first decoded data from the first equalized signal when the condition discriminating signal judges that the first decoded data is optimum, and stopping the step of obtaining the second decoded data from the second equalized signal; and

(e) obtaining the second decoded data from the second equalized signal when the condition discriminating signal judges that the first decoded data is not optimum, and stopping the step of obtaining the first decoded data from the first equalized signal.

28. A data detecting method for equalizing an input signal by partial response by employing at least one of partial response class 4 (PR4) and extended partial response class 4 (EPR4), and decoding the input signal, comprising the steps of:

(a) equalizing the input signal by PR4, and obtaining a first equalized signal;

(b) obtaining a condition discriminating signal for discriminating the optimum data detecting method based on the signal condition of the input signal only by the first equalized signal;

(c) obtaining the first decoded data from the first equalized signal when the condition discriminating signal judges that the first decoded data is optimum, and stopping the step of obtaining the second equalized signal and the step of obtaining the second decoded data; and

(d) obtaining (i) the second equalized signal by equalizing the input signal by EPR4 and (ii) the second decoded data from the second equalized signal, when the condition discriminating signal judges that the first decoded data is not optimum, and stopping the step of obtaining the first decoded data from the first equalized signal.

29. The data detecting method of claim 27 or 28, further comprising a step of:

selecting and controlling generation of first decoded data, stop of second decoded data, stop of first decoded data, and generation of second decoded data, each at different timing,

wherein data is detected without interruption at low power consumption.